a Liane, has, when in a condition where it can freely extend itself, the usual symmetrical wood-structure. But Uttewall * observed a stem of this plant flattened into a band-like form, arising from pressure against the angle of a wall, which form it still retained after it had grown up far beyond it, so that the numerous shoots afterwards developed all partook more or less of this character.

[As somewhat relating to the present subject, may be mentioned a curious fact lately pointed out by Prof. A. E. Rossmässler. He states that the Firs are subject to a peculiarity in the growth of their wood which causes them to split obliquely instead of perpendicularly, and that this occurs, for instance in *Pinus sylvestris*, throughout whole estates, in Bavaria, and it is necessary to raise young plants from foreign healthy seed, since the seeds of these twisted firs inherit the peculiarity of the wood. —*Rep.*]

BIBLIOGRAPHICAL NOTICES.

Rare and Remarkable Animals of Scotland, represented from living Subjects; with practical Observations on their Nature. By Sir John Graham Dalyell, Bart. Volume first, containing fifty-three coloured Plates. London: John Van Voorst, Paternoster Row, 1847. 4to. Pp. 270.

We could wish that this noble volume was in the hands of every one of our readers. It is, always excepting Ellis's 'Essay on Corallines,' the most valuable contribution to Zoophytology ever made by one individual, and contains more that is true and of interest in the economy of zoophytes than any other work hitherto published.

The name of Sir John Graham Dalyell has been familiar to the naturalists of Scotland for nearly half a century. He first introduced himself to their notice by a translation of some of the physiological writings of Spallanzani, a naturalist of congenerous dispositions with himself; and he subsequently became better known by his valuable contributions to our national Encyclopædias, and by his little book on the *Planariæ*, the most interesting by far of any publication on this family of worms. But beyond his native country Sir John was scarcely known until after the meeting of the British Association in Edinburgh in 1834, when the naturalists of England even were taken by surprise on finding one unbruited,—an accomplished scholar and learned antiquary,—who had studied natural history in a more philosophical spirit, and with a less selfish love, than any more blazoned compeer, and who had learned much in the school of nature of what was secret and hidden to others. Henceforth this quietly perse-

* Tijdschr. v. Natuurl. Gesch. en Physiol. iv. 90

vering experimentalist was mentioned by those who write for the public; and foreigners were compelled, almost reluctantly, to acknowledge that the Scotch savans had been for years familiar with facts and phænomena, for the discovery of which, in a less perfect manner, they were seeking the praise and honour of their competitors. The present publication will not only prove Sir John's independent discoveries and priority, but it will place its author in the first rank of those who gain deserved honour by their talent for original observation, and by that devoted love to a subject which carries one unwearied through years of patient experiment, heedless of any future reputation, and regardless of being forestalled by the fear of anticipation which urges on too often to hasty publicity.

In our present notice we shall confine ourselves to the Hydroid Zoophytes. And were we to distinguish these according to diversity in their embryology, the researches of Sir J. G. Dalyell would enable us to divide them into three families, viz. (1.) those which "propagate the young in their own likeness by gemmation or budding from the side;" (2.) those which in the fœtal or larva state resemble the *Medusæ*; and (3.) those which produce an unciliated roundish corpusculum, that, on its escape from the ovarian vesicle, assumes the shape and motions of the *Planariæ*.

The first family is limited to the freshwater Hydræ, and need not now detain us, excepting only to remark that our author appears never to have observed these polypes to propagate by any other means than by gemmation. Their winter eggs, described by others, do not seem ever to have come under his notice.

The species of the second family ascertained to be so by our author are *Tubularia indivisa, T. larynx, T. ramosa* and *Laomedea dichotoma*. The similarity of their larvæ to miniature Medusæ in form, in structure and in habits is so very remarkable, that, even after having witnessed their progressive development and birth from the parent, Sir John can scarcely bring himself to admit their relationship. But there can be no doubt of this, and the metamorphosis is one of the most wonderful in the animal kingdom. We know not that we could make more distinct to our readers the idea of these larvæ than by the comparison of them to Medusæ which has just been made, and must therefore refer to the volume itself for the full details. The interest of the zoologist will not flag in their perusal, and in the examination of the figures; although there is certainly wanting that precise and regular specification of embryotic changes which distinguishes the memoirs of Van Beneden.

The third family embraces *Tubularia ramea, Thoa halecina* and *Beanii, Sertularia polyzonias, abietina, rosacea, pumila, argentea* and *arcta, Antennularia antennina* and *ramosa, Plumularia falcata* and *pinnata*, and *Campanularia verticillata*. All these produce a roundish oviform body, which on, or even previous to, its eduction from the ovarian receptacle assumes the figure of the worms of the genus *Planaria*. Hence it is called a *planule* by our author. It appears to be an immediate evolution from the central pulp, the colour of which it has on its birth; but some species produce planules of at least two

colours, as, for example, the *Plumularia falcata*, which produces some white and some yellow. The number produced varies according to the species, nor does it seem to be uniform even in the same species. After moving about in the open waters for some hours, not by cilia but by inherent mobility, the planule rests and settles on some fixed body, where it contracts itself into a circular spot, whence the young polypidom speedily shoots up in the shape of a primary spine. We quote the author's description of the planules of *Sertularia polyzonias*:

"About fifty planules issued from the vesicles on the 8th of July, the specimens having been procured on the day preceding. These animals were nearly a third of a line in length; the body plump, approaching rotundity, somewhat flattened below, of a smooth uniform aspect, and darker in colour than straw-yellow. In course of their escape they were obviously suspended from various parts of the specimen by an invisible thread; but when reaching any solid surface they advanced with an equal, gliding motion, resembling that of *Planariæ*. The observer could not associate them with any other genus in the 'Systema Naturæ.' No external organs could be detected by the most careful microscopical inspection. They assumed various forms, according to circumstances, and, as afterwards established, these were modified also, according to the period of their existence.

"Many planulæ continued quitting the vesicles from the 8th until the 12th of July. They spread on the bottom and crowded together on the sides of their vessels. Numerous dark green, thick, obtuse spines were rising from spots on the bottom on the 14th of the month. Several were enlarging as buds next day, which had developed as a hydra from some others of them." (p. 146.)

These discoveries in the embryology of zoophytes will necessitate some alterations in their systematical distribution, and will, we are inclined to think, lead ultimately to the recognition of new principles on which to found even their distribution into new classes.

The book is full of particulars relative to the growth, the almost unlimited regerminations, the structure and physiology and the habits of zoophytes, but the interest lies rather in the minutiæ and truth of the details than in general deductions, and cannot be relished unless by a student who will read them seriously and in earnest and in the *spirit* in which they are written, for the *style* is unfortunately sometimes ambiguous and obscure, and too often Johnsonian without the Johnsonian antithesis and elegance. We shall therefore pass on to particularize the species described, making a remark or two as the occasion arises.

1. *Tubularia indivisa*. This is described and illustrated with minute detail, and is evidently a favourite. The experiments made to test its tenacity of life and its regenerative powers remind us of those made by Trembley and Baker on the Hydræ, and they are equally remarkable, but to detail them would be endless, for, as the author tells us, "no definite rules or principles can anticipate the precise course of reproduction," p. 28. Sections of a single stalk will each of them produce a new head, more especially the section

near the base; but the mode of growth of the stalk itself is more remarkable still. The head of the polype falls off and this is followed by an elongation of the fistular stalk, the point from which the elongation started being distinctly marked by a circular stricture; another head is then produced and this again falls away, and again there is an elongation of the stalk upwards; and so on the growth proceeds for several periods in succession. But the successive growths are not regular either in time or in their lengths; the periods and length of the new prolongations being dependent on circumstances not yet understood. There is something in this very curious, and we shall better impress attention to it by the following extract:—"Some remarkable facts attend renewal of the head; and first, the prolongation of the stem seems absolutely dependent upon it. Having lost its head, the stem to all appearance remains stationary, unless in the wound closing; but from the moment that the rising internal bud reaches the vacant extremity in its integument, the neck, or that portion sustaining the young hydra, visibly lengthens, and so continues, until further prolongation is arrested by the separation and fall of the regenerated parts. The wound cicatrizes again. If reproduction follow by another embryo rising within to issue from the summit, a new prolongation ensues also; and so on with a third, a fourth, or more. Thus are formed as many nodes or articulations of the stem.

"Prolongation of the stalk seems combined with the evolution of the hydra by one of the few invariable laws ascertained. But the irregular duration of the successive hydræ or heads produces an irregularity in the accessions to the length of the stalk. One shoot extending six or eight lines may be followed by another of only two or three; and the prolongation seems scarcely sensible where the head flourishes merely to decay. The utmost dimensions of this product are therefore as uncertain as the number of regenerated hydræ whereby they are attained. Let it be always remembered that the prolongation of the hydra's neck is the sole medium of extension of the stem." (pp. 6, 7.)

Sir John Dalyell has not been able on many trials to discover the circulation described by Lister in the stalk of *Tubularia indivisa* (p. 22), but he has seen it, and described with great accuracy its phænomena, in the *Tub. ramosa*, pp. 65 and 69. Thus the discoveries of successive observers will probably prove the circulation of a fluid in the stems to be a general law in the physiology of these zoophytes, for negative observations cannot be allowed to invalidate the positive results obtained by previous naturalists. How many have in vain tried to see the currents in the living sponge; and yet there is no fact better ascertained than the existence of these currents!

2. *Tubularia larynx*. This is very interestingly described and illustrated.

3. *Tubularia ramea*. "This," says our enthusiastic author, "is a splendid animal production—one of the most singular, beautiful and interesting among the boundless works of Nature. Sometimes it resembles an aged tree, blighted amidst the war of the elements, or

withered by the deep corrosions of time; sometimes it resembles a vigorous flowering shrub in miniature, rising with a dark brown stem and diverging into numerous boughs, branches and twigs, terminating in so many hydræ, wherein red and yellow intermixed afford a fine contrast to the whole. The glowing colours of the one and the venerable aspect of the other, their intricate parts, often laden with prolific fruit, and their numberless tenants, all highly picturesque, are equally calculated to attract our admiration to the creative power displayed throughout the universe, and to sanction the character of this product as one of uncommon interest and beauty." (p. 51.)

Very unexpectedly this remarkable zoophyte is proved by our author to belong, not to the family Tubulariadæ, but to the Sertularians, for it produces its germs in a "prolific pod" analogous to the vesicles of the *Sertulariæ*, and these germs are planules on their birth. "Only a single large, bright yellow planule is contained in the vesicle, whence it is discharged on maturity from an orifice towards one side near the summit. But the vesicle itself is of such extreme transparence that it is hardly visible after losing its contents," p. 58. Perhaps we might remove the anomaly in its present place in the system by placing the species in the genus *Thoa*, of which it has the habit.

4. *Tubularia ramosa.* The doubts which have been entertained of the distinctness of this as a species from *T. ramea* are now removed, for the two productions do not belong to the same family, the larva of the *T. ramosa* being medusiform. But its polype differs greatly from that of the genus *Tubularia* as restricted in present systems, for while the head of the latter is naked and exposed and remains so under all conditions and circumstances, this can and does retreat within the tubular extremities of the polypidom for shelter (p. 65).

5. *Hydra viridis*, pl. 12. figs. 17–20.

6. *Hydra fusca*, pl. 12. fig. 15. The only species which the author has found in Scotland. The figures are of the natural size, and very characteristic.

7. *Sertularia polyzonias.* The most complete history of the species that has been published, and the figures are entitled to great praise. We here learn that the polypes or hydræ in the cells of the polypidom may die and be replaced after their decay by others, p. 149. The following passage on the food of these zoophytes is worth extracting:—"The food of the smaller compound zoophytes is problematical; but it is obvious that all must have subsistence to sustain life and promote enlargement. I was induced by the size of the hydra here to attempt feeding them with soft particles of the mussel, a substance the most grateful of any to most of the lower carnivorous tribes; and I believe that I succeeded. I thought the particles might be discovered in the remoter parts of the stomach, whither they were transmitted by a distinct channel. There the contents appeared as a dark internal mass, becoming ovoidal, and the hydra distorted. If the particle be too large, it is retained a long

time externally; nor can it be forcibly removed without the visible reluctance of this diminutive being." (pp. 144–5.)

8. *Sertularia abietina.* A monograph of interest equal to the preceding. The figure on pl. 23 is an admirable portrait of the species. The species has "two differently formed vesicles," "a fact also incident to a few other *Sertulariæ*." One of the vesicles is ampullate or flask-shaped with nearly white contents and numerous oviform corpuscula; the other is compound, "the spherule containing a single yellow globular corpusculum," p. 155. Here we are informed that "great diversity occurs in the shape of the same planulæ, from whatever zoophyte they come. Nothing can be more variable than their soft, extensile and contractile bodies, in motion or at rest; and according to the freshness of their element or the temperature of the atmosphere, and especially when about to undergo the metamorphosis incident to their race." (pp. 155–6.)

The following paragraph is also interesting:—"The evolution of the nascent *Sertulariæ*, from vesicles *in situ*, is a rare occurrence. We have seen that, from some unnatural retention in the cysts of the *Tubulariæ*, the organs of the young may begin to unfold. This may tend to corroborate and explain a figure given by Ellis, representing a hydra issuing from a vesicle of the *Sertularia pumila*. But it is to be noted also that examples are not wanting of portions of the *Sertulariæ* vegetating through an empty vesicle with a generated or regenerated hydra. I can account for it only from the sudden metamorphosis frequently rendering the planule motionless, and thus precluding its escape from the vesicle. But although this may ensue in the *Sertularia abietina*, the discharge of the planule from the vesicle, to undergo its metamorphosis unrestrained, is the ordinary and natural course whereby the species is perpetuated." (p. 156.)

9. *Sertularia abietinula.* This is merely an early state of *S. argentea*, so far at least as fig. 7 of pl. 25 is concerned. Fig. 6 seems to represent a small specimen of *S. abietina*.

10. *Sertularia rosacea.*

11. *Sertularia pumila.* We doubt whether figures 19 and 20 of plate 26 represent this species.

12. *Sertularia halecina* and *cognates.* The natural-sized figures of this species are beautiful and correct, but drawn from small specimens. We differ from the author in referring Ellis's *S. halecina*, as exhibited in pl. 10 of his 'Corallines,' to *Thoa Beanii*; it seems to us to be a good figure, and certainly *not* "from an indifferent drawing," of the true *S. halecina*. This is elaborately described by our author, but we cannot be brought to admit that *Thoa halecina* and *T. Beanii* are only states of one species, although the observations of Sir J. Dalyell shake our confidence in their absolute distinctness. The question is still open to future inquiry.

The following quotation describing the rapid growth of the polypes is interesting:—"Where vigorous hydræ already subsist, the regeneration of others advances in their vicinity—the clear and transparent sheath showing their progressive evolution. Nothing can be more interesting than to witness the rapid refinement of an embryo

hydra into perfect configuration, and the display of the organic parts actually completed under the observer's eye. My notice having been directed to a specimen, wherein, from the highest of three frills, a dark green globular mass rose prominent as an acorn in the cup; in an hour it became somewhat clavate, while turned slightly aside, still enlarging without any indications of tentacula. But in another hour these organs became perceptible through a very delicate transparent involucrum protecting the mass. The head had now protruded almost entirely from the frill, and the extremities of the tentacula separating, having improved the symmetry of the parts, they were gradually and at length freely unfolded two hours afterwards in their due proportions. The new head of the finest green was perhaps the fourth which the twig sustaining it had borne in succession." (p. 165.)

13. *Thoa Beanii.* Well figured and described, and its history completed by the description of the animal and of its planule.

14. *Thoa muricata.* The author has never observed "any visible object" ever discharged from the muricated vesicles of this species, though he has had many specimens at various seasons of the year, and which were preserved with every possible care. He questions whether the capsules are truly vesicles, or whether they are not rather extraneous substances—the capsules of some of the Testacea. They are certainly not the capsules of any bivalve, as suggested, but they may be those of a zoophagous gasteropod. We incline, however, to believe them integral parts of the zoophyte.

15. *Plumularia falcata.* A beautiful history of the species.

16. *Plumularia pinnata.*

17. *Plumularia? fascis.* This is apparently a new species allied to *P. catharina.* The magnified figures are scarcely sufficient.

18. *Sertularia argentea.* The figures appear to us to represent *S. cupressina,* but the author entertains doubts whether the two be truly different, and his observations tend to prove that they are not so. The species has two sorts of vesicles, a simple one resembling a vase, and one "of compound formation, consisting of a hollow pedestal, surmounted by a sphere about three times its diameter," p. 192. The propagation is very minutely detailed.

19. *Antennularia antennina.*

20. *Antennularia ramosa.* The author has proved these to be perfectly distinct. The first has a vesicle which produces "a single yellow embryo" "so large that there seems no room for more. It is evolved as a planula, surpassing the size of any that I have seen issuing from a *Sertularia,* for it is nearly the twelfth of an inch in length," p. 201. But the vesicles of *A. ramosa* contain many—from twelve to thirty—corpuscules, and the planula is very minute, "not exceeding the sixth part of the size of the single yellow planula" of *A. antennina.* After some interesting observations, the author concludes (1.) that *A. antennina* has "a single ruddy stalk ten inches high, begirt by slender verticillate twigs, and bearing axillary ovate vesicles, each containing a single yellow planule;" (2.) that *A. ramosa* is "a greenish shrub, diverging into boughs and branches, clothed

with twigs: likewise with slender, prolonged, plumose vegetations sometimes interspersed, whereon, besides hydræ, are borne long ampullate axillary vesicles, each containing many planulæ;" (3.) that *A. ramosa* may have three vesicles all different from each other in form; (4.) "that vigorous reproductive energies reside in the *ramosa*, which are readily and frequently exhibited, while similar energies are feeble and rare in the *A. indivisa*." (p. 209.)

21. *Laomedea dichotoma*. Admirably described and figured. The cell of the polype is deciduous. The larva is medusiform, and has some resemblance to a hand-bell. "It swims by jerks, or bounds like the various species of Medusæ, from collapse of the body, perhaps aided by the tentacular organs. It pursues all directions, rising, falling, or remaining stationary in equilibrio. Like a group of the *Medusa bifida*, these creatures narrowly resemble a flock of minute birds wending their course through the expanse of the firmament." (p. 216.)

22. *Campanularia verticillata*. The margin of the polype-cell is either "plain or serrated," a remark which may tend to reconcile the discrepancies in the descriptions of some allied species. The cells are normally deciduous, falling off with the decay of the polypes. "The two are mutually dependent on each other," p. 219; the very reverse of what exists in the Sertulariadæ. The larva is a planule.

23. *Campanularia dumosa*. The generic relations of this species remain unascertained. Its structure, says Sir J. Dalyell, is very different from *Laomedea dichotoma* or *Campanularia verticillata*. The polype is a vivid grass-green. The mode of propagation is unknown.

24. *Campanularia syringa*. Another doubtful member of the genus *Campanularia*. The structure of the cell is peculiar, nor does it fall off on losing the polype. This has about sixteen tentacula. "That number has been ascertained as the complement of several. I have not observed any of the hydræ with only eight tentacula, which is in fact a very rare characteristic of any of the marine hydraoid zoophytes," p. 223.—The species which follows affords an exception to this remark.

25. *Sertularia arcta*. This is the same as the *Campanularia intertexta* of Couch. The polype has eight tentacula, and a few individuals only have ten. The larva is a planula, "but instead of being generated within a pod or vesicles as others from the hydraoidal *Sertulariæ*, its matrix consists of a congeries of cavities or compartments, as seen in the surface of the mass. An aperture being discovered in the middle of each after the planula has been discharged, we may presume that no more than one is contained in a compartment," p. 225. The production is evidently the type of an undefined genus.

We shall continue our analysis in a future number.

In the Press.

We are glad to learn that Mr. Gosse, author of the 'Birds of Jamaica,' 'Canadian Naturalist,' &c., is about to publish a series of

lithographic drawings, illustrative of the species described in his 'History of the Birds of Jamaica.' The figures will be drawn on the stone by the author himself, partly from original drawings and partly from preserved specimens, with the advantage of his own notes and personal knowledge of attitudes, &c.; and they will be very carefully coloured. The number of species proposed to be illustrated amounts to about a hundred and twenty; of which more than one-half are not figured in English works, worthy of reference, while a considerable number are new to science.

The work is to be issued monthly, and is not to exceed the extent of thirty numbers.

PROCEEDINGS OF LEARNED SOCIETIES.

COTSWOLD NATURALISTS' CLUB.

At a Meeting of the Cotswold Naturalists' Club, held at Rodborough Common, May 18th, 1847, Dr. Wright of Cheltenham exhibited a beautiful preparation of the *Geophilus longicornis*, Leach, in which he had observed the veneniferous glands of that Myriapod. He had found no description of these glands in any of the great authorities on the structure of the articulate animals whom he had consulted, from which he inferred that these bodies had hitherto escaped observation.

Dr. Wright observed that the salivary glands in the vertebrate animals are in general absent in those classes and tribes which live habitually in water. In Fishes they are absent, an increased mucous secretion being poured into the mouth by a great development of the buccal follicles. In Batrachia distinct glands are absent, a compensative secretion being supplied by the mucous glands of the mouth and tongue. In the Cetacea they exist only in a rudimentary state. Hence the conclusion that animals that seize their prey in the water and swallow it without mastication have no necessity for saliva as a preliminary solvent for the digestive process, the gastric juice in these animals being sufficient to complete the chemical changes in the stomach. In the invertebrate classes salivary glands are absent in all the Radiata, nor do we observe these bodies in the Tunicated or Acephalous Mollusca; but they are found in the Gasteropoda and Cephalopoda; they are absent in the Entozoa, but exist in a rudimental state in the Annelida and Crustacea. In all the classes of the Articulata that respire air, as Myriapoda, Insecta and Arachnida, salivary vessels can be demonstrated: these organs may be subdivided into simple and compound glands.

A. When the secretion supplied is a fluid concerned in the digestive process, the secreting organ is a simple tube with its distal extremity closed.

B. When the secretion supplied is used for the destruction of prey, the secreting organ is a compound body or gland.

In the majority of Insecta the salivary vessels are simple ramified tubes that open into the gullet, but in Hemiptera simple tubes and